

SESSION 7: LINEAR GRAPHS AND PARABOLA

X-planation

- (1) Transformations are an important part of functions. Make sure that you know that a graph of the form $y = f(x - a)$ is the graph of $y = f(x)$ but shifted a unit to the right. A graph of the form $y = f(x + a)$ is the graph of $y = f(x)$ but shifted a unit to the left.
- (2) Determining the equation of a given graph is important.
- (3) The turning point of a quadratic function in the form $y = ax^2 + bx + c$ can be determined by completing the square to rewrite the function in the form $y = a(x + p)^2 + q$. An alternative method is to use the formula $x = -\frac{b}{2a}$ to get the x-value of the turning point.

X-ample Questions

Question 1

Consider the functions $f(x) = 2x + 4$ and $g(x) = x^2 + 2x$

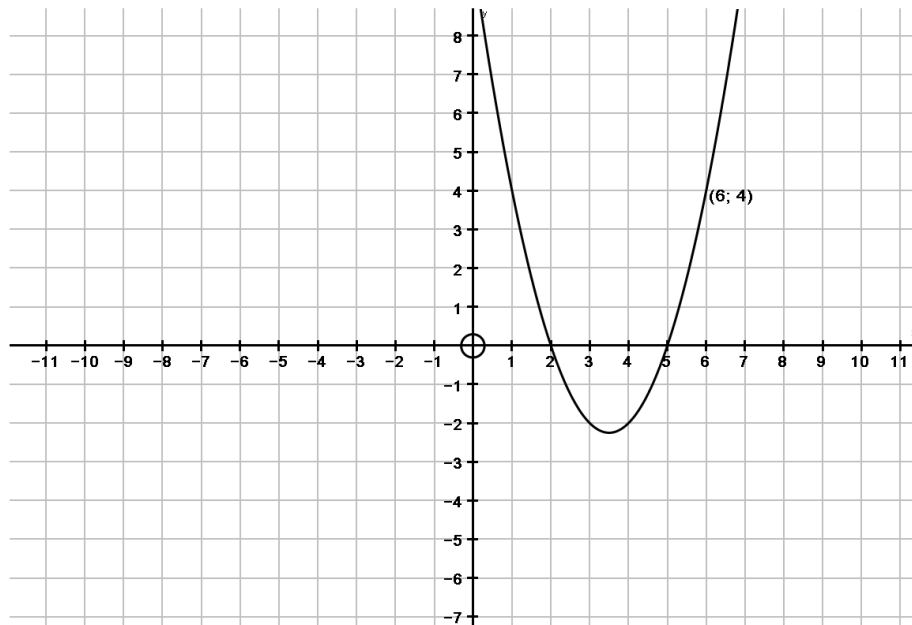
Determine:

- (a) $f(-2)$ (1)
- (b) A if $f(A) = 0$ (2)
- (c) x if $f(x) = g(x)$ (3)
- (d) Give the domain of the function g . (2)
- (e) Give the range of the function g by first writing it in the form $g(x) = (x - p)^2 + q$. (4)

Question 2

Determine the equation of the parabola below, giving your answer in the form:

$$y = ax^2 + bx + c : \quad (4)$$

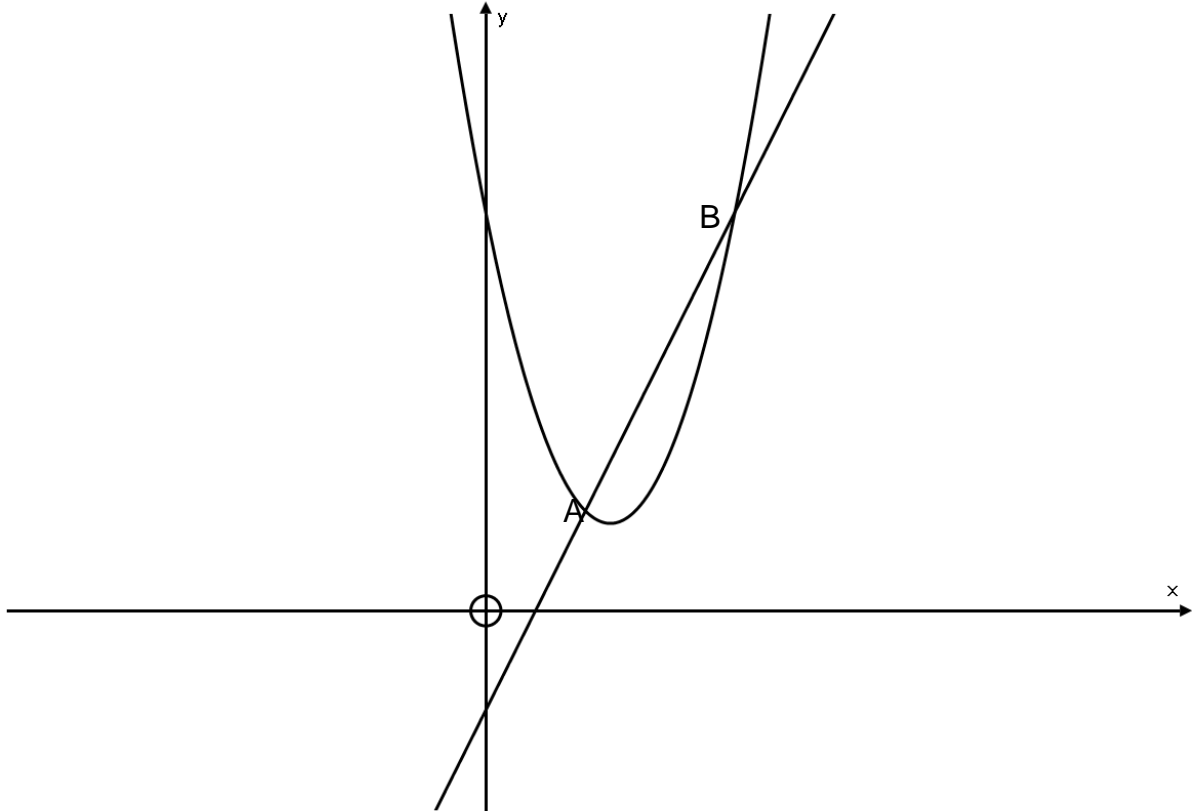


Question 3

Find the equation of the parabola which has a turning point at $(5; -6)$ and passes through the point $(2; 12)$. Give your answer in the form $y = a(x - p)^2 + q$. (4)

Question 4

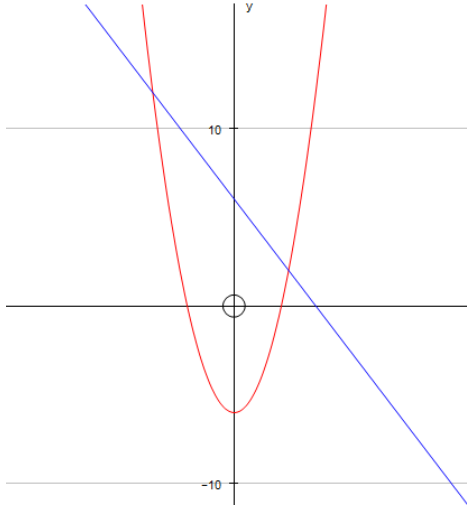
Consider the graphs of $f(x) = x^2 - 5x + 8$ and $g(x) = 2x - 2$ below:



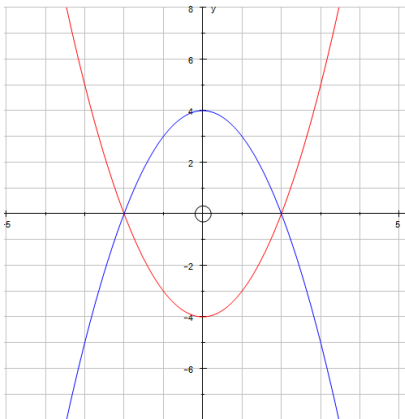
Determine the coordinates of A and B, the points of intersection of f and g . (4)

X-ercises

1. The functions $f(x) = 2x^2 - 6$ and $g(x) = -2x + 6$ are shown below



- Calculate the points of intersection of f and g
 - Write down the equation of the linear function h that cuts f at the turning point and is perpendicular to g
 - Find the point of intersection between g and h
2. Examine the graphs $h(x) = x^2 - 4$ and $k(x) = -x^2 + 4$ drawn on the same set of axes below:



- Describe the relationship between h and k .
- Give the equation of $k(x)$ reflected about the line $y = 4$.
- Give the domain and range of h .